

## REMARKS

### Amendments

Claims 1-11, 13 and 15 are currently pending in the application upon entry of the foregoing amendments. Claims 1 and 15 are amended to include the limitation of claim 14 that the catalyst contact time is from 10 milliseconds to 500 milliseconds. Support for this amendment may be found throughout the specification, including at page 12, lines 3-11. Reconsideration of the present application, as amended, and allowance of the pending claims is respectfully requested in view of the following remarks.

### Rejection Under 35 U.S.C. § 103

The Examiner rejected claims 1, 4-11, and 13-15 under 35 U.S.C. § 103(a) as being unpatentable over U.S. 6,409,940 to Gaffney et al. (hereinafter "Gaffney") and U.S. 2001/0041159 to Tamhankar et al. (hereinafter "Tamhankar"). The Examiner rejected claims 1-11 and 13-15 under 35 U.S.C. § 103(a) as being unpatentable over U.S. 6,254,807 to Schmidt et al. (hereinafter "Schmidt") and Tamhankar. The Examiner rejected claims 1-11 and 13-15 under 35 U.S.C. § 103(a) as being unpatentable over Gaffney in view of Schmidt and Tamhankar. The Examiner rejected claim 15 as being unpatentable over Gaffney in view of Tamhankar and U.S. 4,331,451 to Isogaya et al. (hereinafter "Isogaya") and over Gaffney in view of Schmidt, Tamhankar, and Isogaya. Applicants respectfully traverse the rejections.

The cited prior art fails to establish a *prima facie* case of obviousness of the claims as amended because the cited references fail to disclose each and every element of the Applicants' amended claims. Specifically, neither Gaffney, Tamhankar, Schmidt, nor Isogaya, alone or in combination, remotely teach or suggest a process for conversion of a feed gas mixture comprising a heavy hydrocarbon fuel, wherein the feed gas mixture comprises a carbon to oxygen ratio from about 0.5 to about 1.0, wherein the catalyst contact time is from 10

milliseconds to 500 milliseconds, and wherein the process operates without the addition of steam or water as required by the Applicants' amended claims.

Gaffney discloses processes for producing synthesis gas from light hydrocarbons (C1-C5) and oxygen at ratios of 1.25:1 to about 3.3:1 in a short contact time (< 10 milliseconds). Schmidt discloses a process for enhancing syngas production in a partial oxidation reaction using light hydrocarbons and oxygen at ratios of 2.5 to 10 (equivalent to O<sub>2</sub>:C ratios of 0.2 to 0.8) in a short contact time (0.1 to 20 milliseconds). One of ordinary skill in the art would not be inclined to modify Gaffney or Schmidt for the conversion of heavy hydrocarbon fuels as the Examiner suggests. On the contrary, one skilled in the art would appreciate that the extremely short contact times required by both Gaffney and Schmidt would be insufficient for the conversion of the heavy hydrocarbon fuels required by the Applicants' claimed invention. For example, Applicants' disclose that "[w]ith a contact time of less than about 10 milliseconds, there is a tendency toward incomplete conversion." (Page 12, Lines 6-7). Moreover, while Schmidt does disclose that heavier hydrocarbon liquids may be used, Schmidt further discloses doing so will only "crack heavier feedstocks to lighter hydrocarbon fractions while raising the temperature of the reactant mass for subsequent treatment." Col. 4, Lines 9-20. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would not modify Gaffney or Schmidt for treatment of heavy hydrocarbon fuels as required by the Applicants' claimed invention.

Applicants further submit that Tamhankar does not supplement the deficiencies of Gaffney or Schmidt required to establish a *prima facie* case of obviousness by suggesting the desirability of using heavy hydrocarbon fuels. Rather, Tamhankar discloses processes for producing synthesis gas from the catalytic partial oxidation of light hydrocarbons with oxygen at ratios of 1.5 to 2.0 in order to reduce the initiation temperatures. Although Tamhankar does

disclose that C5-C8 alkanes or alkenes may be used in the process, use of such fuels requires additional processing. Specifically, Tamhankar discloses that heavy hydrocarbon fuels “may be adapted for use in the present process.” Page 2, para [0016].

Moreover, Applicants respectfully submit that the Examiner erroneously relies on Tamhankar to teach the carbon to oxygen ratio required by the Applicants. Although Tamhankar discloses that “reactions having C:O<sub>2</sub> ratios of less [than] about 1.5 can also be conducted at low initiation temperatures using the metal catalysts of the present invention,” such “reactions may be characterized more as combustion-like processes, instead of partial oxidation processes.” Page 4, para [0030]. Tamhankar teaches that such “combustion-like processes” are undesirable “because it competes with the partial oxidation reaction for the available oxygen source, and results in lower than expected conversion of the hydrocarbons.” Page 1, para [0008]. Accordingly, one of ordinary skill in the art would not be inclined to use a C:O<sub>2</sub> ratio of less than about 1.5, as required by the Applicants claimed invention, because doing so would result in a more combustion-like process – a process which Tamhankar expressly teaches as being undesirable.

Applicants further submit that neither Gaffney, Schmidt, Tamhankar, nor Isogaya remotely teach or suggest the desirability of maintaining a catalyst contact time from 10 milliseconds to 500 milliseconds, as required by Applicants’ amended claims. On the contrary, Gaffney and Schmidt specifically teach that it is desirable to minimize the contact time of the reactor. Although Tamhankar does disclose contact times ranging from 1 to 500 milliseconds, Tamhankar further discloses that such contact times “depend[] on the particular feed gases, catalyst, pressure and space velocity employed.” (Page 3, para [0027]). Thus, Applicants respectfully submit that one of ordinary skill in the art would not expect such short contact times

to be suitable for both light hydrocarbon fuels (as taught by Tamhankar) and heavy hydrocarbon fuels (as taught by Applicants).

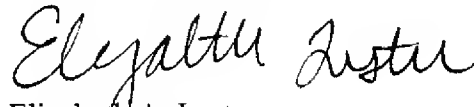
In sum, the combination of the cited references fails to establish a *prima facie* case of obviousness. Accordingly, the rejections must be withdrawn.

### **Conclusions**

For the foregoing reasons, Applicants submit that claims 1-11, 13 and 15 are patentable over the cited prior art. Allowance of the pending claims is therefore earnestly solicited.

If there are any issues which can be resolved by a telephone conference or an examiner's amendment, the Examiner is invited to telephone the attorney at (404) 853-8012.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Elizabeth Lester", written in a cursive style.

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